AMP2-VSD and AMP2-VSDA

2U Digital Audio Speaker Monitor

With SDI Input and Output on BNC, Two AES Inputs on BNC and XLR, Two AES Outputs From SDI on BNC, Four Analog Inputs on XLR (-VSDA Only), Two Selected Analog Stereo Outs on XLR, Four High-Res 53-Segment Level Meters, Summable Channel Assignment, and Phase Indication

Document P/N **821581** Rev-**B**

User Manual

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Important Safety Instructions

1) Read these instructions.
2) Keep these instructions.
3) Heed all warnings.
4) Follow all instructions.
5) Do not use this apparatus near water.
6) Clean only with dry cloth.
7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8) Do not install near any heat source such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10) Protect the power cord from being walked on or pinched, particularly at plugs convenience receptacles and the point where they exit from the apparatus.
11) Only use attachments/accessories specified by the manufacturer.
12) Use only with the cart stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13) Unplug this apparatus during lightning storms or when unused for long periods of time.
14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15) Do not expose this apparatus to rain or moisture.
16) The apparatus shall be connected to a mains socket outlet with a protective earthing connection.

CAUTION!

In products featuring an audio amplifier and speakers, the surface at the side of the unit, where the audio amplifier heat sink is internally attached, may get very hot after extended operation. When operating the unit excercise caution when touching this surface and ensure that external materials which may be adversely affected by heat are not in contact with it. There is a Hot Surface label (see diagram) attached to the aforementioned surface of the product.

Introduction

Congratulations on your selection of a Wohler Technologies product. We are confident it represents the best performance and value available, and we guarantee your satisfaction with it.

If you have questions or comments you may contact us at:

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Section 1

General Features and Specifications

Description

Features

Applications

Specifications

Installation

Congratulations on your selection of a Wohler Technologies **AMP2-VSD** or **AMP2-VSDA** audio monitor unit. We are confident it represents the best performance and value available, and we guarantee your satisfaction with it.

If you have questions or comments you may contact us at:

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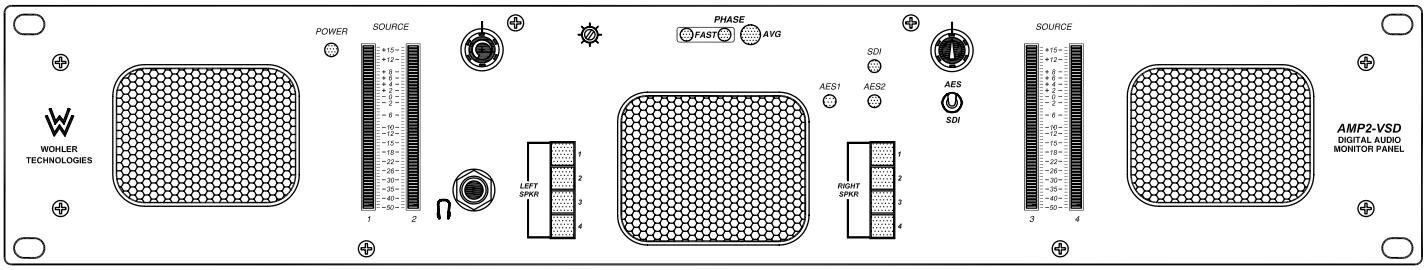
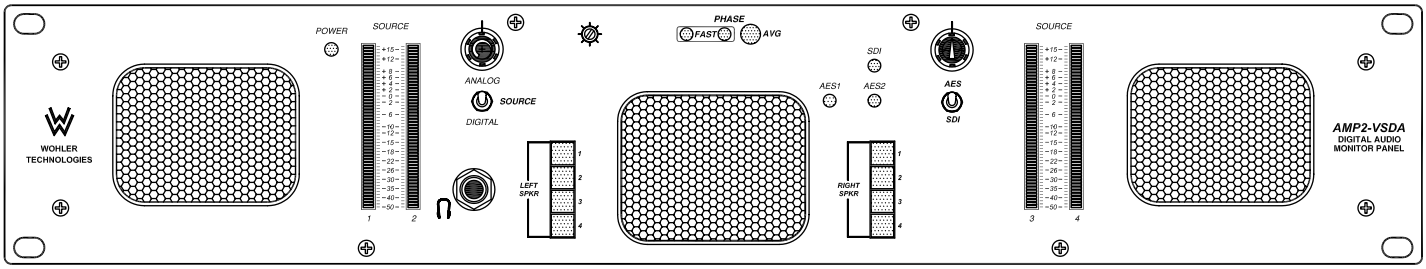
AMP2-VSD and AMP2-VSDA

Powered Audio Monitors



AMP2-VSD Front Panel



AMP2-VSDA Front Panel

Description

The **AMP2-VSD** and **AMP2-VSDA** are monitors capable of audibly monitoring up to four source channels through a stereo speaker system while simultaneously visually monitoring all four channels of the selected source via four high-resolution 53-segment LED bargraph level meters. Both models process digital AES and SDI audio signals, while the **AMP2-VSDA** is also capable of processing up to four analog audio signals. Two banks of four buttons on the front panel are used to independently assign from one to four (summed) channels to each of the two (left and right) speaker channels. AES signal status is indicated by two bi-color (red/green) LEDs. SDI signal status is indicated by one bi-color (red/green) LED. Features include a ganged stereo volume control and balance pot, power indication LED, and headphone output. Output limiter circuits are incorporated to protect the speakers, and extensive magnetic shielding allows placement immediately adjacent to video monitors with no color impurities. Wohler Technologies proprietary three-LED stereo phase indication feature allows monitoring of phase relationships of the selected stereo inputs.

Rear panels for these monitors feature an **SDI** input and loop-through on BNC connectors, two **AES** inputs on unbalanced BNC connectors, two alternate **AES** inputs on balanced XLR connectors, two **AES** outputs (converted from the **SDI** input) on BNC connectors, and a stereo analog output of the channels assigned to the left and right speakers on two balanced XLR connectors. The **AMP2-VSDA** additionally features four **analog** inputs on balanced female XLR connectors.

All **AMP2 Series** units contain three audiophile-quality drivers and three power amplifiers; two amplifiers (and two speakers) that reproduce midrange and high frequency information in stereo, and a third amp/driver combination (and speaker) that handles summed Low Frequency (LF) information below the 500 Hz crossover point. The **AMP2 Series** unique audio design has two important advantages. First, it provides optimally focused sound in an Ultra Near Field ™ (1 to 3 feet) environment. This allows higher SPL for the operator while reducing overall ambient sound and adjacent bay crosstalk. Second, electronic rather than acoustic cancellation of bass frequencies provides positive audible detection of reversed polarity (“out of phase”) audio feeds.

Features

- 104 dB SPL at two feet
- Only two rack spaces high
- Excellent high frequency response for positive detection of background whine and noise
- Audible and visual indication of phase/polarity problems
- Thorough magnetic shielding for placement next to video monitors
- Four 53-segment high-resolution tri-color bargraph level meters:
  - -Selectable Input Referrence Level (0, +4, +6, or +8 dBu)
  - -Selectable Display Mode (VU Only, VU/PPM, or PPM Only)
  - -Selectable Peak Hold (Manual, 3-Second, 10-Second, or Off)
  - -Selectable PPM Ballistics (Type I, Type II, DIN 45406, or SSRT)
  - -Selectable alternate Bargraph Scales (Extended VU, VU, BBC, NORDIC, or DIN)
  - -Selectable Phase Correlation feature
- SDI input and loop-through on unbalanced BNC connectors
- Two AES/EBU inputs on unbalanced BNC connectors
- Two alternate AES/EBU inputs on balanced XLR connectors
- Four analog inputs on balanced XLR connectors (AMP2-VSDA only)
- Two AES outputs (converted from SDI input) on BNC
- Four analog outputs (from selected digital source) on Phoenix
- Stereo analog output of the channels monitored by the left and right speakers on two balanced XLR connectors
- Two banks of four push buttons for assigning single or summed channels to the left and right speaker
- Select AES or SDI input source via a front panel toggle switch
- Select analog or selected digital source via front panel switch
- One SDI signal status/error indication LED
- Two AES signal status/error indication LEDs
- Headphone output
- Power indication LED

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Applications

The **AMP2-VSD** and **AMP2-VSDA** are ideally suited for use in VTR bays, mobile production vehicles, teleconferencing installations, multimedia systems, satellite links and cable TV facilities, and on-air radio studios. Designed and manufactured in the U.S., both models are backed by a strong warranty and a satisfaction guaranteed return policy.

General Specifications

Input Connectors:	**SDI**: BNC, **AES**: BNC/XLR, **Analog**: XLR
Analog Input Impedance: **Digital Input Impedance:**	**XLR**: 70K Ω, bal. (AMP2-VSDA Only) **BNC**: 75 Ω, unbal., **XLR**: 110 Ω, bal.
Peak Acoustic Out (@ 2 ft.):	104 dB SPL
Power Output, **RMS Each Side (4Ω):** **RMS Bass (4Ω):**	 14 W transient / 10 W continuous 35 W transient / 25 W continuous
Frequency Response, **Sixth Octave:**	80 Hz - 16 kHz ± 5 dB) (-10 dB @ 40 Hz, 20 kHZ)
Input Level for Maximum Output (Volume Full On):	0 dBv balanced / -10 dB unbalanced
Hum and Noise (analog):	Better than -68 dB below full output
Distortion, Electrical:	Less than 0.15% at any level below input threshold
Distortion, Acoustic:	6% or less at worst case frequencies above 120 Hz, including cabinet resonance; typically less than 1.5%
Input Overload:	+26 dBv balanced
Converted Analog Out S/N:	>90 dB
Converted Analog Out THD:	<0.008%
Magnetic Shielding:	<0.8 Gauss any adjacent surface
Power Consumption **(Average Maximum):**	 45 W
AC Mains Input:	100-240VAC, 50-60 Hz Universal

Level Meter Specifications

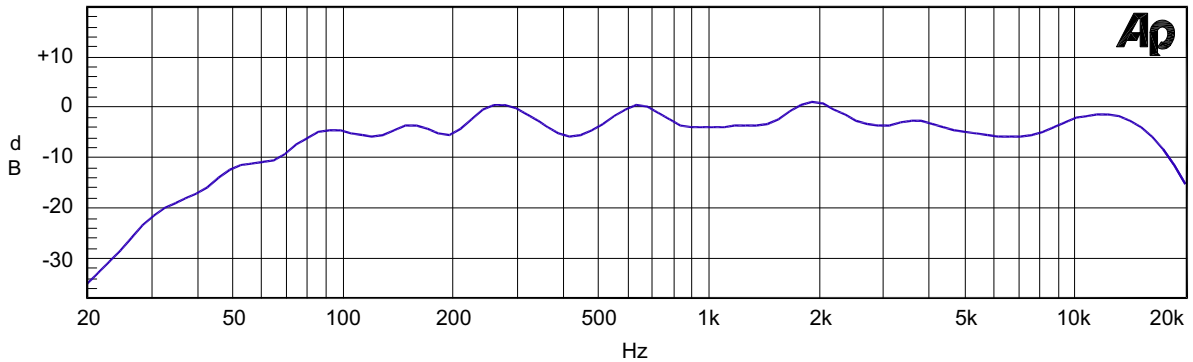
Level Meter Type:	53-Segment tri-color (R,A,G) LED
Display Modes (select):	VU, PPM, or VU/PPM
Peak Hold (select):	Manual, 3-sec, 10-sec, or OFF
PPM Ballistics (select):	Type 1, Type 2, DIN 45406, or SSRT
Reference Levels:	0, +4, +6, +8 dBu (DIP selectable)
Phase Correlation:	ON or OFF
Bargraph Scales:	VU, Ext. VU, BBC, NORDIC, or DIN
Dynamic Range:	65 dB
Midscale Resolution:	1 dB
Segment Colors:	Tricolor (green, amber, red)
Scale:	+16 to -50 dB
Segment Size:	.158" x .04" (4.0132 x 1.016 mm)

Physical Specifications

Weight:	18 lbs. (8.2 kg)
Dimensions (HxWxD):	3.5 x 19 x 12 inches (89 x 483 x 305 mm)

NOTE: For **SDI** specifications see page **19**.
For **AES** specifications see page **20**.

Audio Response Curve



Typical 1/6 Octave Audio Response Curve

Units are designed to meet, at time of manufacture, all currently applicable product safety and EMC requirements, such as those of CE. 0 dbV ref. 0.775V RMS. Features and specifications subject to improvement without notice.

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Installation

Mounting

The unit should be mounted where convenient for operating persons, ideally at approximately ear/eye level for best high frequency response and visual observation of the level meters. Its superior magnetic shielding eliminates concerns about locating it adjacent to most types of CRT monitors, including even high-resolution color monitors.

Heat Dissipation

Heat dissipated by the speaker amps is conducted directly to the left side of the chassis; no special considerations for cooling are necessary as long as the ambient temperature inside the rack area does not exceed approximately 40°C (104°F).

Sympathetic Vibration

Sympathetic vibration from other equipment (cables, etc.,) in the rack may be serious enough to interfere with the unit's sound quality out in the listening area. The use of thin card stock and/or felt or foam weather-stripping type materials between adjacent vibrating surfaces, or tying up loose cables, etc., may be required to stop vibrations external to the unit.

Mechanical Bracing

Even though the unit is fairly heavy, the chassis is securely attached to the front panel at eight points along its surface, not just at the four corners of the chassis ears. This feature will reduce or eliminate rear bracing requirements in many mobile/portable applications. The weight of internal components is distributed fairly evenly around the unit.

Audio Connections

Connection of the audio feeds is straightforward. Please refer to the system interconnect block diagram on pages **27** and **28** for clarification of the general signal paths into and out of the unit.

Care should be exercised to avoid mismatched cable types and other similar causes of undesired reflections in RF signal systems. If severe enough, such reflections can result in corruption of the digital datastream.

AC Power

The unit's AC mains connection is via a standard IEC inlet, with safety ground connected directly to the unit's chassis. The universal AC input (100-240VAC, 50/60Hz) switching power supply is a self-resetting sealed type, with automatic over-voltage and over-current shutdown. There is no user-replaceable fuse in either the primary or secondary circuit.

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Section 2

Operation

Front Panel Features

Rear Panel Features

Audio Amplifier and Speaker Configuration

Balance Control Characteristics

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Front Panel Features

Please refer to **Figure-2a** on the facing page to familiarize yourself with the front panel features of the **AMP2-VSD** and **AMP2-VSDA** units. The following sections describe these features and are referenced, by number, to **Figure-2a**.

1 Speakers

The **AMP2 Series** monitors feature two mid-range speakers (left and right) and one woofer speaker. Two amplifier/driver combinations handle midrange and high frequency information in the left and right (stereo) speaker channels, while the third channel reproduces and sums the left and right channel information below the 500 Hz crossover point in the woofer (bass) speaker. Note that the woofer channel is NOT a dedicated **LFE** (subwoofer) or **Center** channel. See page **16** for more information concerning the **AMP2 Series** audio amplifier/speaker configuration.

2 Audio Level Meter LED Bargraph Displays (1-4)

Audio levels for the four selected source channels are displayed via these four tri-color LED bargraph meters. The four bargraph meters display audio levels for the digital or analog audio sources selected for monitoring. All bargraph LED segments are of the tri-color type (GREEN, AMBER, RED) and are user adjustable for **Referrence Level**, **Display Mode**, **Peak Hold**, **PPM Ballistics**, **Alternate Bargraph Scales**, and **Phase Correlation** via DIP switches on the rear panel and inside the unit. For factory set and user adjustable level meter DIP switch settings, see pages **23** and **24**. For more information about the **Phase Correlation** feature, see page **26**. For meter specifications, see page **5**.

3 Headphone Jack

This jack accepts a standard 1/4" phone type stereo headphone plug. Select the headphone audio sources as you would for the internal speakers. When you plug in headphones, the speakers will mute.

4 Speaker Assign Channel Buttons (Left and Right)

Use the *left* bank of four buttons to assign one to four of the four available channels for monitoring from the *left* speaker channel. Use the *right* bank of four buttons to assign one to four of the four available channels for monitoring from the *right* speaker channel. Channel buttons toggle On/Off and will light up BLUE to indicate they are selected.

Operation for channel selection for each bank of four buttons is as follows:

1) **Single Channel Select:** Press and *release* a single channel button to select that channel (and *deselect* any previous selection). Pressing and releasing the selected channel button *again* will deselect it.
2) **Multi-Channel Select (Summing):** Press and *hold down* a desired channel button, then press other channel buttons to add (sum) additional channels (or press any again to deselect). Release *all* buttons to accept the selection set. When multiple channels are selected, pressing and *holding* an already selected channel button will allow further modification to the selection set. Releasing *all* buttons accepts the new selection set. Pressing and immediately *releasing* an already selected channel button will select only it and deselect all other channel selections. Note that if channels assigned to either the left or right level meters are multi-channel (summed), then the respective level meter will indicate summed audio levels.

If the user presses a previously selected (lighted) channel button, but then decides not to make any changes to the selection set, the user should keep the button *depressed* for at least **1.5 seconds** before releasing it. This will preserve the current selection set as though the button was never pushed.

5 Power LED

This LED glows GREEN to indicate the unit is connected to mains power and an operation voltage is present.

6 Volume Control

This controls the loudness of the audio reproduced by the internal speakers or connected headphone. Clock-wise rotation of this control increases the loudness of the monitored audio.

7 Analog/Digital Source Select Switch (AMP2-VSDA Only)

This two position toggle switch, featured only on the **AMP2-VSDA**, allows the operator to choose between the two primary input sources; **ANALOG** or **DIGITAL**. When this toggle switch is set to **ANALOG**, the unit will monitor the signals as input on the rear panel **ANALOG IN** XLR connectors (**Item K**, page **14**). When this toggle switch is set to **DIGITAL**, the unit will monitor the digital source (**AES** or **SDI**) as selected by the **AES/SDI Digital Source Select Switch** (**Item 13**, page **10**).

8 Bargraph Brightness Trim Pot

This control is recessed into the front panel and can be accessed using a small screwdriver. Turning it clockwise will increase the relative brightness of all bargraph display LED segments. Adjusting this one control will simultaneously affect the brightness of all bargraph displays on the front panel.

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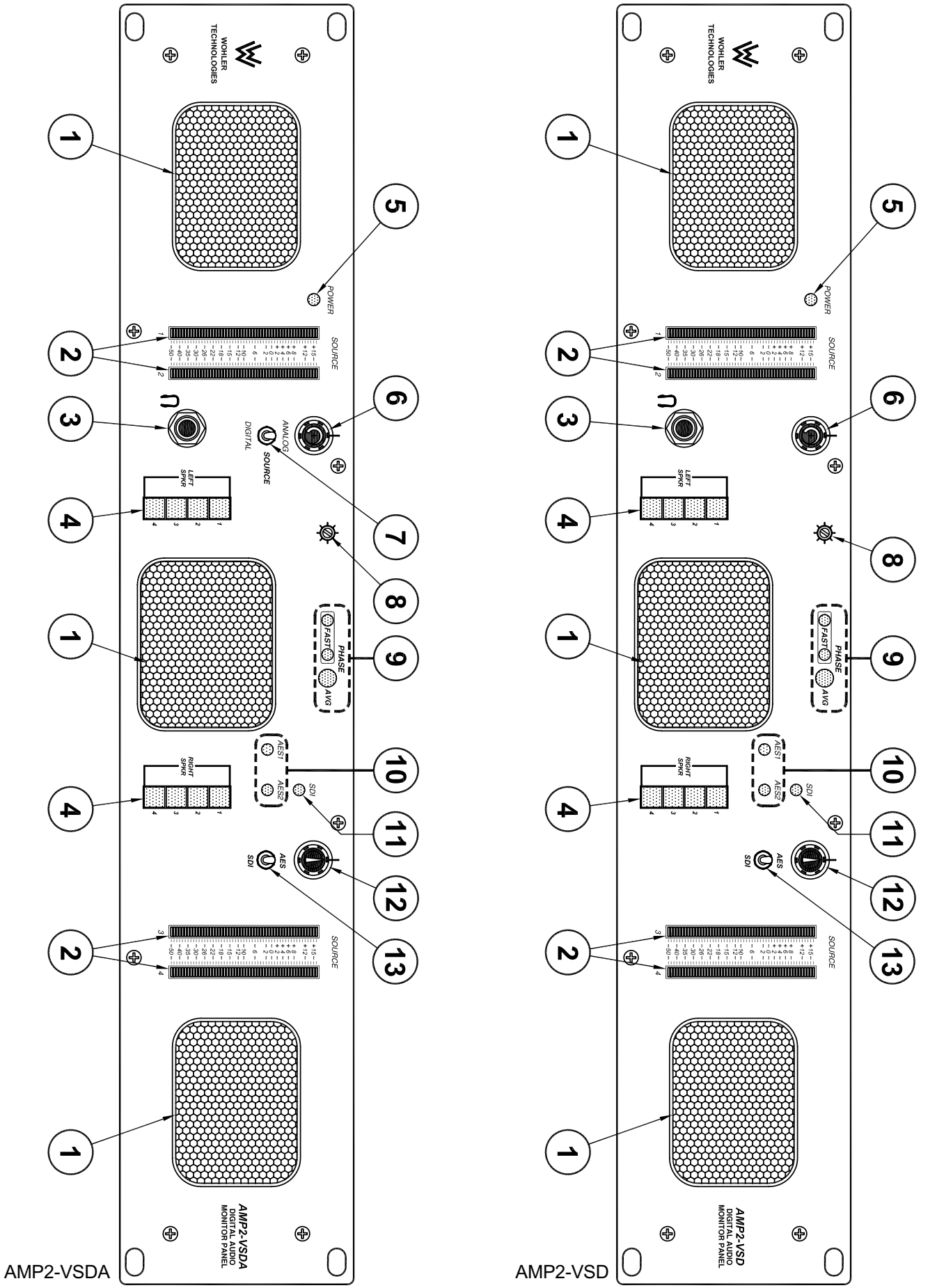

Figure-2a: Front Panel Features

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Front Panel Features

(Continued)

9 Phase Indication LEDs

These three LEDs indicate the instantaneous and average phase (polarity) conditions between the two signals in the channel pair (or downmix) assigned to the left and right speaker channels. The two smaller LEDs labeled **FAST** show *instantaneous* phase relationships in the signal. The larger LED labeled **AVG** will indicate the *average* phase condition. Indication is as follows:

- The ***left*** **FAST** LED glows (or blinks) GREEN for ***in-phase*** signals.
- The ***right*** **FAST** LED glows (or blinks) AMBER for ***out-of-phase*** signals.
- The large **AVG** LED indicates the *average* phase condition by glowing GREEN for ***in-phase*** signals, or RED for ***out-of-phase*** signals.

In general, observing the **AVG** LED alone is sufficient for proper phase monitoring. While it is normal for stereo signals to contain some intermittant instantaneous *out-of-phase* and *in-phase* conditions (**FAST** LEDs), a steady RED glow of the **AVG** LED indicates an *out-of-phase* alarm condition.

10 AES Status LEDs (AES 1 and AES 2)

These two bi-color GREEN/RED LEDs (**AES1** and **AES2**) indicate the input presence and status of the two **AES** input signals. Either LED glows GREEN as long as a valid **AES/EBU** digital datastream for the associated input channel is being received. Either LED glows RED to indicate errors in signal reception *or* data errors (if the data has been tagged as inappropriate for conversion to analog by having the validity bit set). These LEDs function whether or not the **AES** digital signals are selected for monitoring through the unit.

11 SDI Status LED

This bi-color (GREEN/RED) LED, labeled **SDI**, glows GREEN as long as a valid **SDI** digital datastream is being received. It glows RED if TSR errors are present in the signal. If there is no SDI signal present the LED will be unlit. This LED functions whether or not the **SDI** digital signal is selected for monitoring through the unit.

Note: If you wish to disable *data* error indication (and leave only indication of signal *reception* errors) you can place jumpers on **H14** and **H18** of the **919050** AES-to-Analog conversion PCB. See page **22** for component locations.

12 Balance Control

This control changes the volume balance between the left and right speaker channels. Note that this control attenuates the signal from the source, so that the left and right *bass* frequencies (summed together and reproduced in the woofer channel) will respond to balance adjustments in tandem with the left and right speaker channels. See page **16** for more information concerning the balance control characteristics.

13 AES/SDI Digital Source Select Switch

This two position toggle switch allows the operator to choose between the two digital input sources; **SDI** or **AES**.

When this toggle switch is set to **AES**, the unit will monitor the **AES** signals as input on the **AES IN** BNC or XLR connectors (**IN 1** and **IN 2**) on the rear panel (**Item C** or **G**, page **12**). When this toggle switch is set to **SDI**, the unit will monitor the **SDI** signals as input on the **SDI IN** BNC connector on the rear panel **(Item D**, page **12**).

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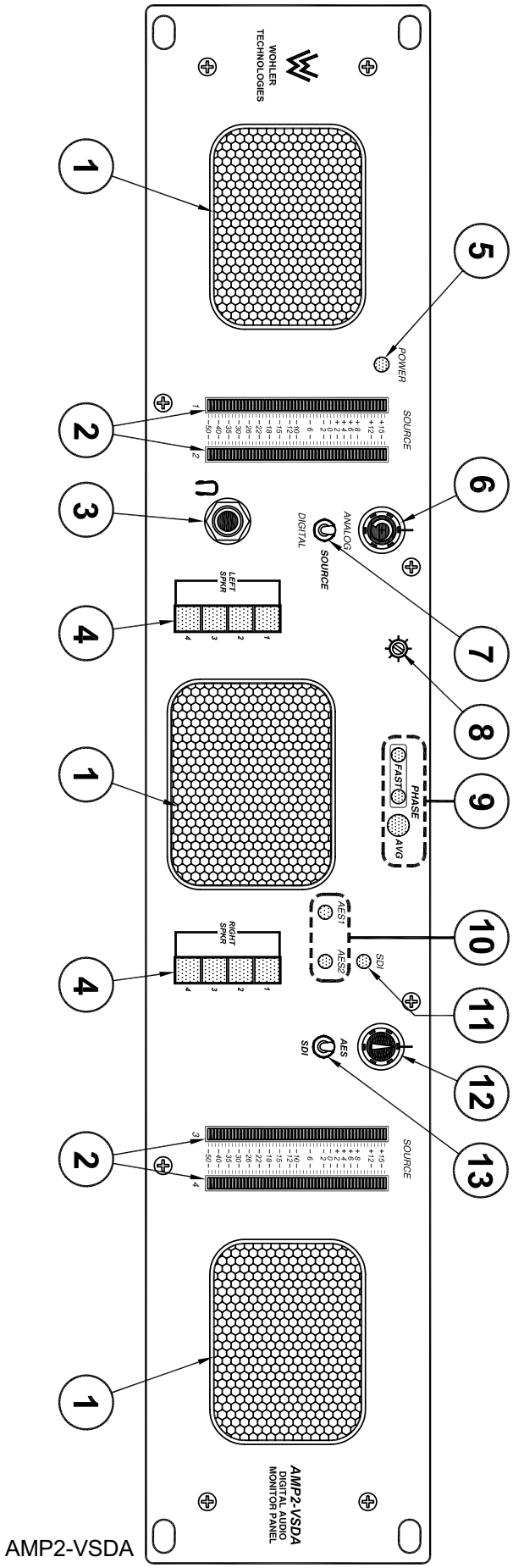
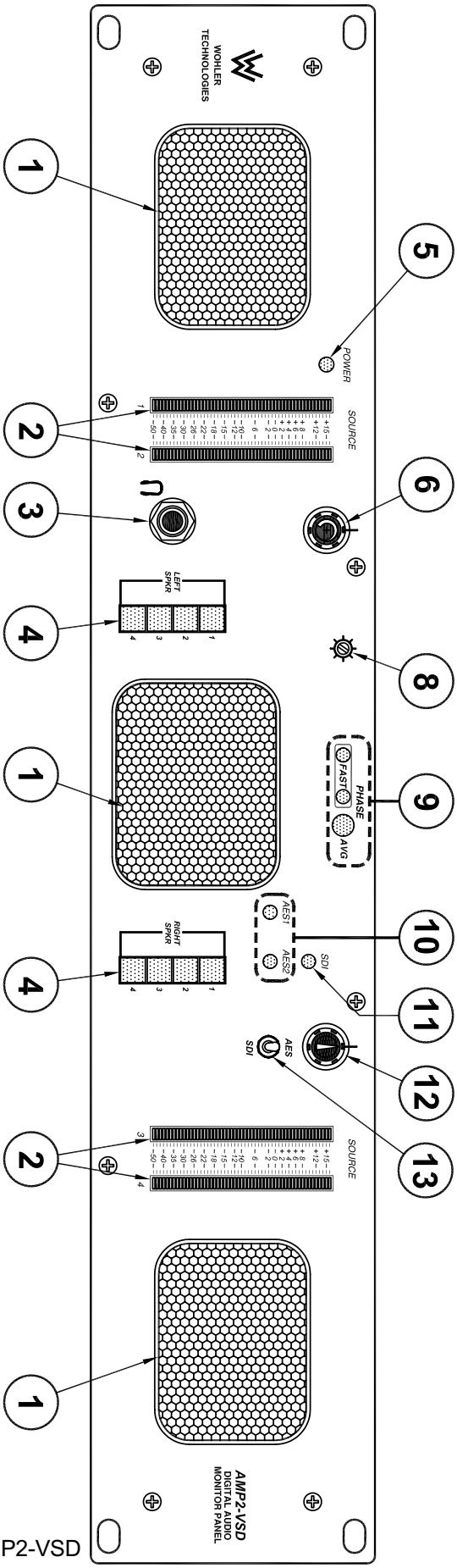


AMP2-VSDA



AMP2-VSD

Figure-2a: Front Panel Features

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Rear Panel Features

Please refer to **Figure-2b** on the facing page to familiarize yourself with the rear panel features of the **AMP2-VSD** and **AMP2-VSDA** unit. The following sections describe these features and are referenced, by letter, to **Figure-2b**.

A Power Connector

Attach a standard IEC-320 power cord between this connector and mains power (100 - 250VAC, 50/60 Hz). The front panel **Power LED** (**Item 5**, page **8**) will glow GREEN to indicate operating voltages are present.

B AES Input Unbalanced BNC Connectors (AES IN 1 and AES IN 2)

These two female BNC input connectors (**AES IN 1** and **AES IN 2**) are meant to receive standard **AES** signals and are configured for unbalanced, 75 Ω connections. Note that the unit will monitor these inputs *only* when the **Analog/Digital Source Select Switch** (**Item 7**, page **8**) is set to **DIGITAL** and the **AES/SDI Digital Source Select Switch** (**Item 13**, page **10**) is set to **AES**.

Note: Do *not* input signals simultaneously to the BNC and XLR **AES** input connectors of the same channel (i.e. BNC connector **AES IN 1** and XLR connector **AES IN 1**).

C AES Output (From SDI Input) Connectors (1 and 2)

These two **"AES OUT-FROM SDI"** BNC connectors output an **AES** digital signal as converted from the **SDI IN** input connector (**Item D**) and function regardless of any monitor selection settings. The *left* **AES OUT-FROM-SDI** connector (next to **AES IN 1**) outputs a signal converted from **SDI sub-group 1** (channels **1/2**) and the *right* **AES OUT-FROM-SDI** connector (next to **AES IN 2**) outputs a signal converted from **SDI sub-group 2** (channels **3/4**).

D SDI Input and Output Connectors

The **SDI IN** input connector is meant to receive a standard **SDI** signal. This female BNC connector is configured for an unbalanced, 75 Ω connection. The unit monitors sub-group 1 (channels **1/2**) and sub-group 2 (channels **3/4**) of **SDI Group ID #1**. Note that the unit will monitor the **SDI** input *only* when the **Analog/Digital Source Select Switch** (**Item 7**, page **8**) is set to **DIGITAL**, and the **AES/SDI Digital Source Select Switch** (**Item 13**, page **10**) is set to **SDI**.

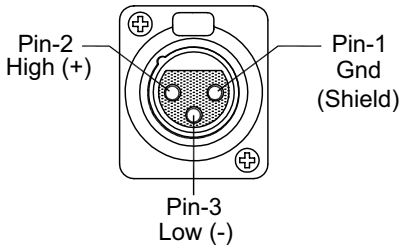
The **SDI OUT** loop-through connector outputs a reclocked (regenerated) copy of the signal entering the **SDI IN** input connector. This female BNC connector is configured for an unbalanced, 75 Ω connection.

E Level Meter DIP Switch

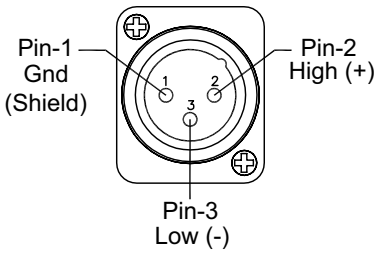
This DIP switch sets the **Line Level Calibration**, **Reference Level**, and **PPM/VU Display Mode** for the level meter LED bargraph displays on the front panel. See page **23** for for setting information.

F Selected Analog Output Connectors

These two 3-pin male XLR connectors are **analog** outputs of the selected source(s) as assigned to the left and right speakers. The left connector outputs the left channel (**Channel A**) and the right outputs the right channel (**Channel B**). Both connectors are configured for low impedance connections and the output signals are not affected by the volume/balance controls or headphone mute. For XLR pinout information see the diagram below.



Female XLR Pinout



Male XLR Pinout

G AES Input Balanced XLR Connectors (AES IN 1 and AES IN 2)

These two 3-pin female XLR input connectors (**AES IN 1** and **AES IN 2**) are meant to receive standard **AES** signals and are configured for balanced, 110 Ω connections. Note that the unit will monitor these inputs *only* when the **Analog/Digital Source Select Switch** (**Item 7**, page **8**) is set to **DIGITAL**, and the **AES/SDI Digital Source Select Switch** (**Item 13**, page **10**) is set to **AES**. For XLR pinout information see the diagram under **Selected Analog Output Connectors** (**Item F**).

Note: Do *not* input signals simultaneously to the XLR and BNC **AES** input connectors of the same channel (i.e. XLR connector **AES IN 1** and BNC connector **AES IN 1**).

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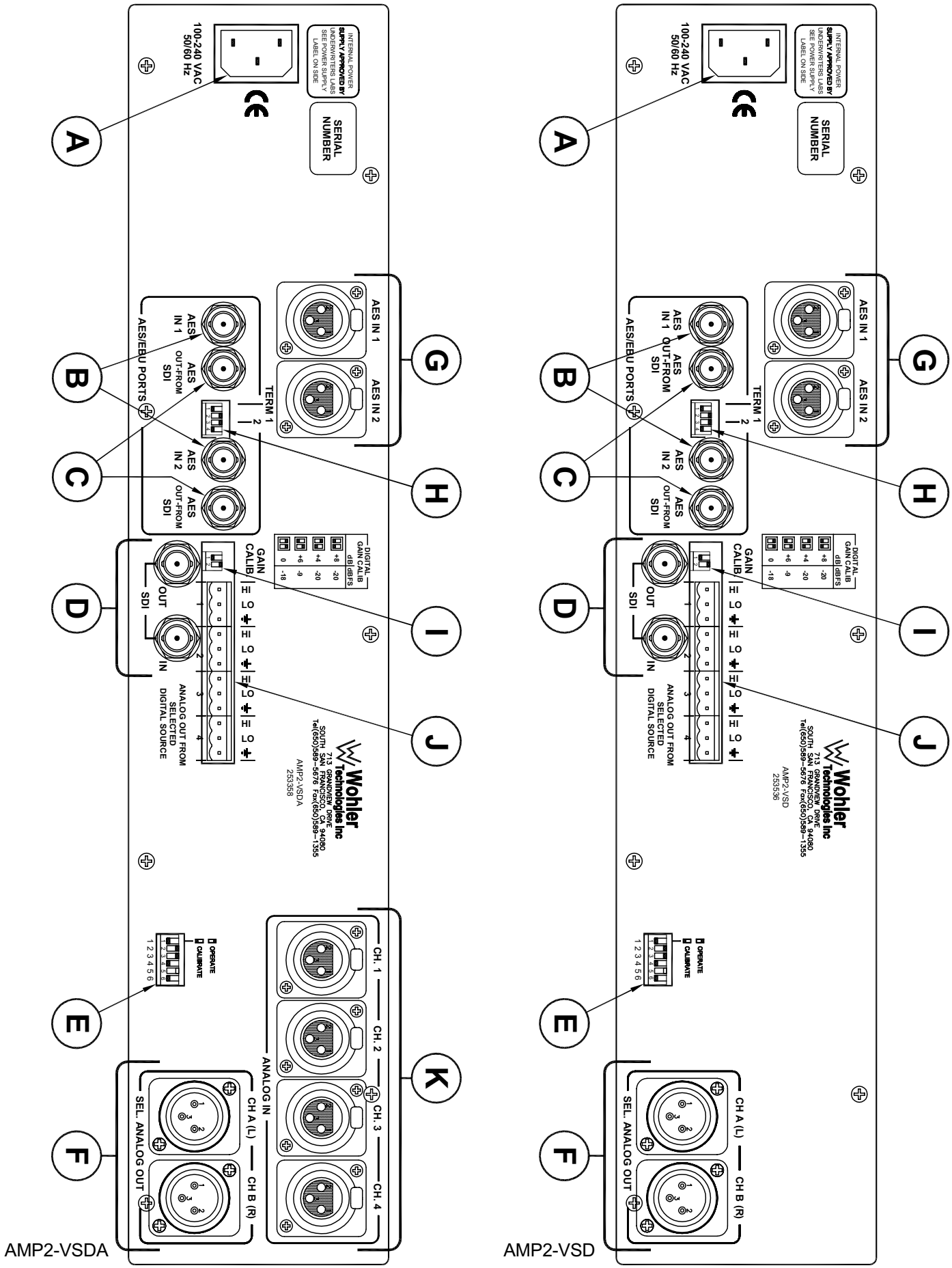

AMP2-VSDA AMP2-VSD

Figure-2b: Rear Panel Features

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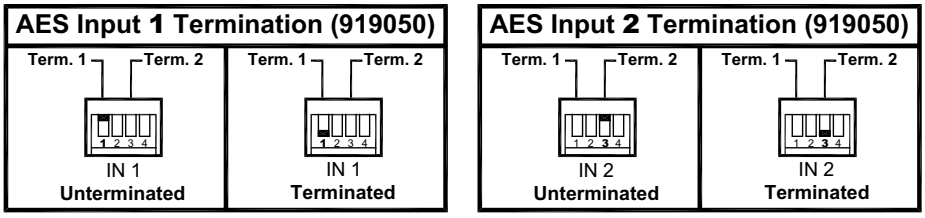
Rear Panel Features

(Continued)

H AES Input Termination DIP Switch

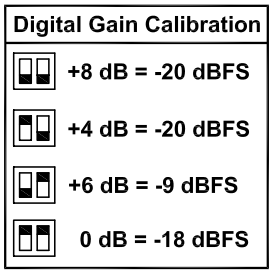
This 4-position DIP switch module is used to set the termination characteristics for the **AES** inputs. In the event that either of the two **AES** input channels is fed to downstream equipment, the associated DIP switch section (**section 1** = **AES IN 1** and **section 3** = **AES IN 2)** must be placed in the **UP** (**Unterminated**) position. If there is *no* downstream equipment connected, then the associated DIP switch section must be placed in the **DOWN** (**Terminated**) position. See below for a diagram of termination settings. **Note:** Sections **2** and **4** of the DIP module are not used.



Note: Positions S2 and S4 of DIP switch are not used.

I AES Input Level Gain Calibration DIP Switch

Input **Level Gain Calibration**, the analog level which corresponds to a given digital input value, is settable via this DIP switch. The factory setting is +4 dB (analog) = -20 dBFS (digital). See the silk-screened chart on the rear panel or the diagram below for settings.



J Converted Analog Out Connectors (1-4)

These four Phoenix connectors output **Analog** signals converted from the selected digital inputs (but not the **analog** inputs). These ouputs are *not* affected by the position of the **Analog/Digital Source Select Switch** (**Item 7**, page **8**). These 3-pin male Phoenix connectors are configured for a balanced low impedance connection. Phoenix connector pin-out information is silk-screened just above these connectors on the rear panel (see **Figure-2b**).

K Analog Input Connectors (CH. 1 - CH. 4)

These four 3-pin female XLR connectors accept standard **analog** audio signals and are configured for balanced 70K Ω connections. For XLR connector pin-out information, see the diagram under **Item F** on page **12**. Note that the **Analog** inputs are monitored *only* when the **Analog/Digital Source Select Switch** (**Item 7**, page **8**) is set to **ANALOG**.

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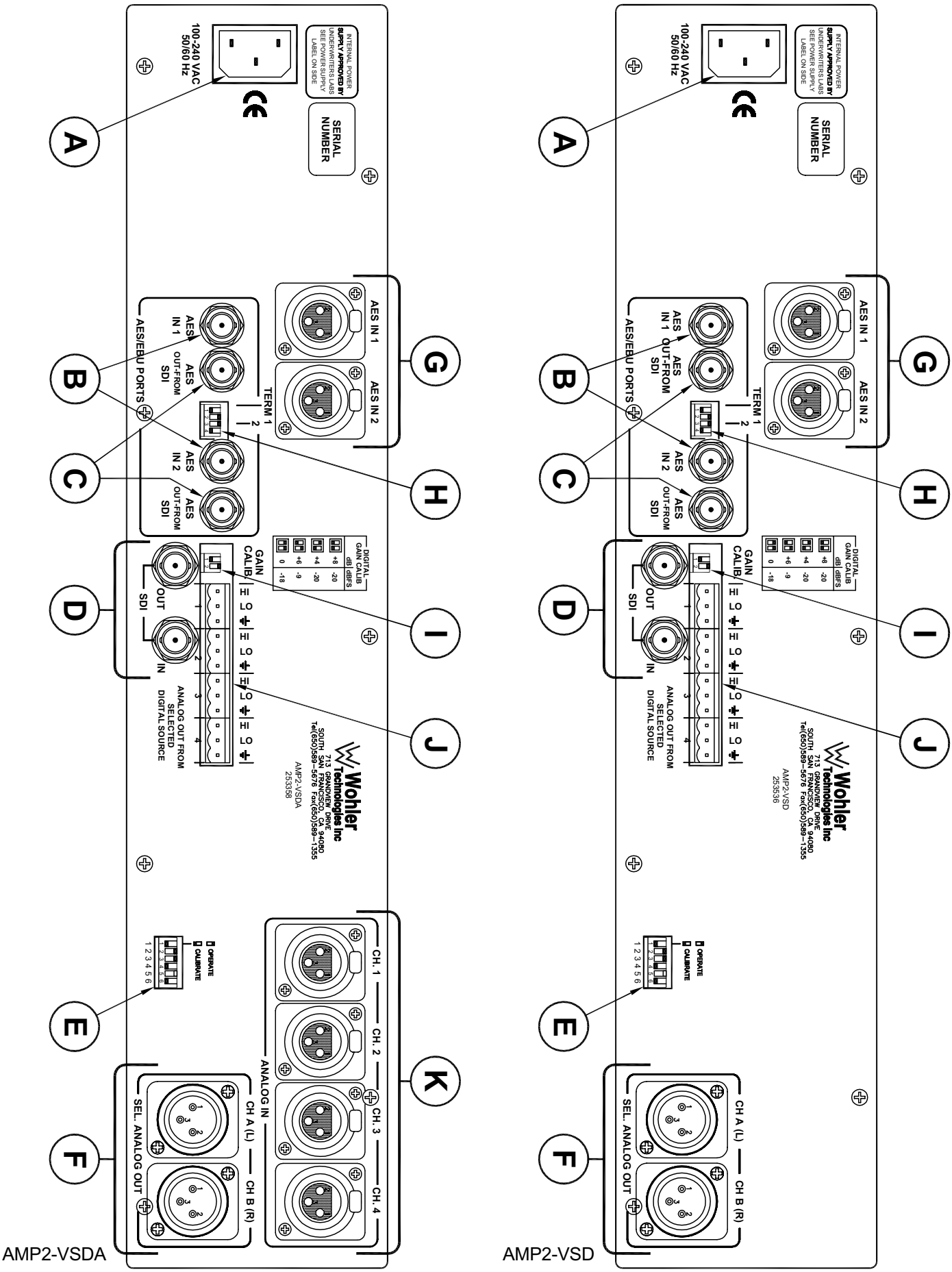

Figure-2b: Rear Panel Features

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Audio Amplifier and Speaker Configuration

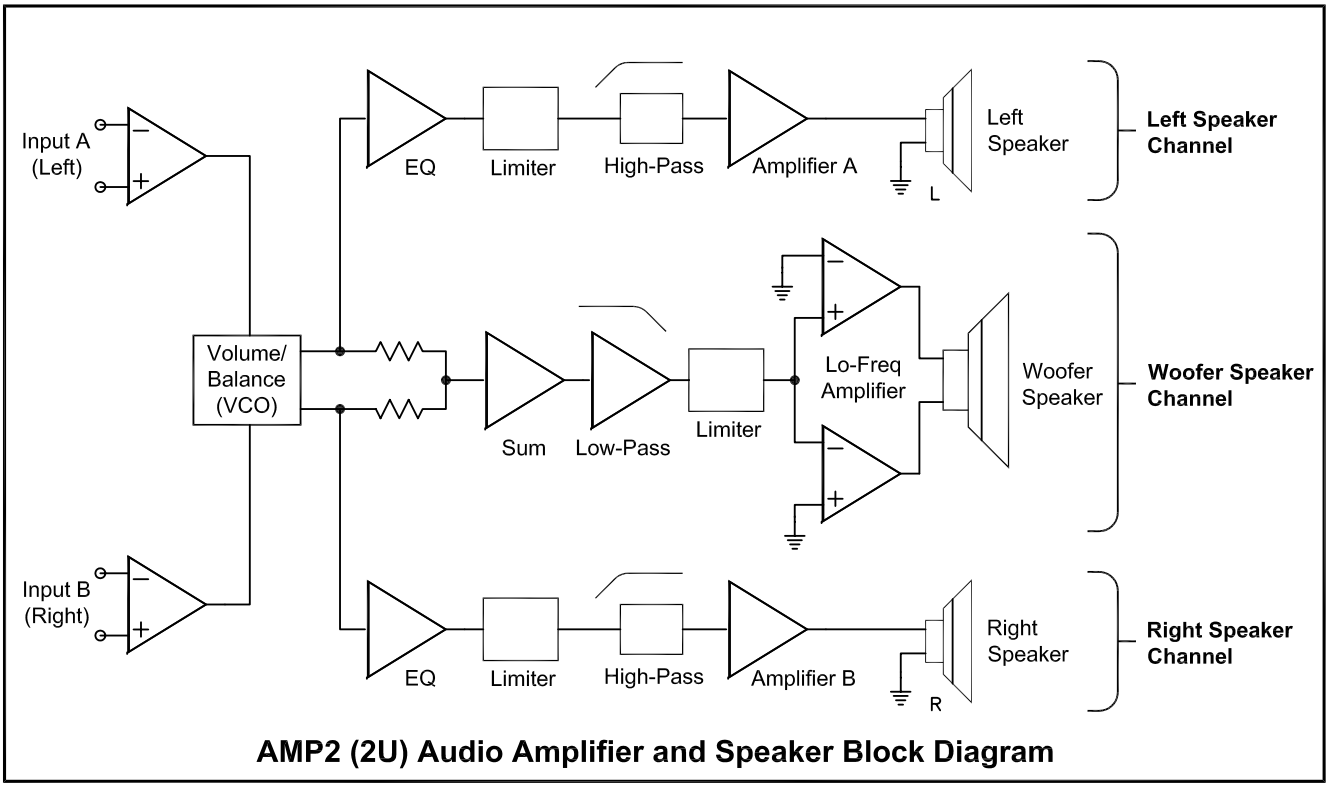
General Description

All models in the **AMP Series** contain high performance transducers (speakers) driven by three power amplifiers; two amplifier/driver combinations handle midrange and high frequency information in the left and right (stereo) speaker channels, while the third amplifier channel sums the left and right channel information *below* the 500 Hz crossover point in the woofer (bass) speaker(s). Note that the woofer channel is NOT a dedicated **LFE** (subwoofer) or **Center** channel.

Speaker Configuration

All **AMP2** (2U) products are configured with two speaker channels (left and right) to reproduce midrange and high-range audio frequencies (in stereo) and one woofer speaker channel to reproduce the summed (combined) *low-range* audio frequencies from the left and right speaker input channels.

See below for a simplified diagram of the **AMP2** audio amplifier/speaker configuration.



AMP2 (2U) Audio Amplifier and Speaker Block Diagram

Balance Control Characteristics

The balance control attenuates the signal from the source, so that the left and right bass frequencies (summed together and reproduced in the woofer channel) will also respond to the balance control.

Example:
If an audio signal of a voice speaking English is fed to the *left* (A) input and a voice speaking Spanish is fed to the *right* (B) input, then the *left* speaker channel will reproduce the midrange and high-range frequencies of the English speaking voice, the *right* speaker channel will reproduce the midrange and high-range frequencies of the Spanish speaking voice, and the *woofer* speaker channel will reproduce the summed (combined) low-range frequencies of *both* voices.

If the balance control is rotated to the *left* (English), then the Spanish speaking voice in the *right* speaker channel will diminish in volume and the Spanish speaking voice in the *woofer* speaker channel will also diminish.

Note that if the balance control is rotated completely to the left, the volume in both the left speaker channel and woofer speaker channel will increase slightly to maintain overall output level. See the simplified diagram below for placement of the balance control in the audio amplifier circuit.

The converse of the above is true if the balance control is rotated to the right.

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Section 3

Technical Information

General Technical Observations

SDI to AES Converter Module PCB (919096)

AES to Analog Converter Module PCB (919050)

AES Digital Gain Fine Adjustment (919050)

AES Error Jumper Locations (919050)

Level Meter Rear Panel 6-Position DIP Switch Settings

Level Meter Internal 10-Position DIP Switch Settings

AMP2-VSD Interconnect Block Diagram

AMP2-VSDA Interconnect Block Diagram

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General Technical Observations

General Mechanical Observations

Elimination of cabinet and component sympathetic vibrations (resonances) requires considerable attention to mechanical details. Because of this, and the physical constraints of the speaker's acoustic enclosures, even minor changes to any of the mechanical details of the unit can seriously impair its acoustic performance. This especially applies to the speaker baffles. If mechanical work on the unit is necessary, be sure to make adequate notes to permit accurate reassembly.

Unfortunately, the unusual and wholly proprietary method of magnetic shielding is usually degraded slightly by any disassembly of the unit, except removal of the rear panel. Almost any maintenance or repair will require removal of the cover. If an immediately adjacent video monitor shows magnetic interference after reassembly of the unit, it must be returned to the factory to restore the shielding completely.

General Audio Circuitry Observations

Since a single-sided power supply is used, all amplifier sections are "biased" with a 1/2 supply reference, so all opamp signal terminals on the main board should have a DC level of +12V, +/-0.7V. Signal inputs to the main audio board from any of the input select circuits are via the balanced input stage, in lieu of the XLR analog inputs on the basic unit. Signal feed points for level meters and the phase indicator are immediately after the input stage, and before the volume control section.

The signal pick-off for the headphones is after the volume and balance controls. Speaker muting is controlled by circuitry that senses connection of headphones to the jack.

The power amps are attached to an aluminum heatsink plate (which is also connected to the circuit common for these devices). The heatsink plate forms an operational module separate from the chassis, which allows access to the solder side of the circuit board while power is applied to the circuitry. To avoid thermal shutdown of the power amp(s), they should NOT be operated without their tabs being fastened to the heatsink plate.

Variations in the frequency response of different production runs of drivers has sometimes required minor adjustments in the equalization/crossover components in individual runs of units. Some of these components may have values slightly different than those indicated in the schematic, which are the nominal ones. If any of the drivers (speakers) are replaced, it may be helpful to change some of these components to achieve maximum flatness of response.

The operating threshold of the woofer limiter is critical to both satisfactory reproduction of musical transients and preventing damage to, or destruction of, the speaker itself. The side speaker output limiter circuits are similarly important, though not as critically adjusted.

The woofer power amps are arranged in a bridge configuration; care must be taken to avoid letting EITHER speaker terminal contact the chassis (common) OR THE GROUNDED LEAD OF ANY TEST EQUIPMENT so as not to short out the power amps. The side speaker outputs are single-ended, so these precautions are not necessary for them.

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SDI to AES Converter Module PCB (919096)

The **919096** (**Serial Digital to AES Converter**) module allows selected Wohler Technologies audio monitoring systems to be connected directly to a serial digital video signal containing embedded audio. Two levels of component signals (eg., D1, D5, and Digi Betacam type) are currently supported; synchronous audio at 48 KHz with either 20-bit data packets or audio and extended data packets. The **919096** module demultiplexes (extracts) the audio data from the video data, reformatting it to the **AES** standard. A companion digital-to-analog converter module (**919050**) is used to convert the **AES** signal to **analog** audio.

In the **AMP Digital Series** units, channels 1 and 2 (first subgroup) and channels 3 and 4 (second subgroup) from **SDI Group ID #1** are demuxed before being input to the **AES** to analog conversion module (**919050**). Access to **SDI Group ID #2**, **#3**, and **#4** is optional and should be specified at time of order.

919096 Specifications

Input characteristics:	75 Ohm (BNC), AC coupled, 15 dB minimum return loss, 10-270 MHz
Receiver type:	Auto equalizing with clock regeneration
Sensitivity performance:	Tolerates cable loss of at least 30 dB @ 135 MHz
SDI input level:	400 - 1000 mV
Input formats:	Component, either 525 or 625 lines w/ 48 KHz audio
Audio sampling rate:	48 KHz
SDI output type:	Fully regenerated copy of SDI input signal (equalized and regenerated, scrambled NRZI)
SDI output:	15 dB minimum return loss, risetime 0.75-1.5 ns (20-80%)
SDI output level:	800 mV +/-10%
AES from SDI output:	75 Ω BNC
AES data bits:	20
Error Indication:	Bi-color LED (red/green) Off = no signal Green = signal present Red = Error

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AES to Analog Converter Module PCB (919050)

Description

The **919050 Digi-2** (**Dual Input AES to Analog Converter**) module allows selected Wohler Technologies products to receive input signals in the **AES** or **SPDIF** digital audio data formats. Sampling rate and format selection are sensed and set automatically.

Two front panel mounted bi-color (RED/GREEN) LEDs provide visual indication of input signal status. The LEDs light GREEN when receiving a valid, error-free data stream, but turn RED when errors are detected. See **Item 10** on page **10** for more information about error detection and indication.

There are two **AES** inputs, which are configured with unbalanced 75 Ω BNC connectors and balanced 110 Ω XLR connectors. This module also features a four-channel balanced **analog** line-level output, which can be configured with unbalanced 75 Ω BNC connectors or balanced 110 Ω Phoenix or XLR connectors.

919050 Specifications

Input formats:	AES/EBU or SPDIF
Digital-to-Analog Conversion:	24-bit low jitter
Sampling rate:	31 kHz to 48 kHz
Termination:	Removable (DIP switch selectable)
Analog out (of digital source), **S/N:** **THD (full output):**	 Greater than 96 dB Less than 0.008%
Max output of analog out:	+24 dBv (0 dBv = 0.775 vRMS)
D to A gain calibration, **(dB = dBFS):**	 +8 = -20, +4 = -20, +6 = -9, 0 = -18 (DIP switch selectable)
Standard input connectors: **Optional input connectors:**	BNC: 75 Ω, unbalanced Phoenix or XLR: 110 Ω, balanced
Standard output connectors: **Optional output connectors:**	BNC: 75 Ω, unbalanced Phoenix or XLR: 110 Ω, balanced
Error Indication:	Two Bi-Color LEDs (on front panel): Green = OK Red = Error, no lock to signal, or no signal.

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AES Digital Gain Calibration Fine Adjustment (919050)

The digital gain calibration is set at the factory for +4 dB (Analog) = -20 dBFS (Digital). Three other values (+8 = -20, +6 = -9, and 0 = -18) may also be user selected via a DIP switch on the rear panel (**Item I**, page **14**). However, if a fine adjustment of the calibration is desired, perform the following procedure:

1) Remove the top cover. Save screws for later reassembly.

2) You must remove the **919083 PCB** to access the trim pots (**P1-P4**) on the **919050 PCB** (see **Figure-3a** below for trim pot locations).

3) Connect a digital (**AES**) source of known digital amplitude and set the unit's controls to monitor that source. For convenience sake, it would be best to use your facility's digital reference level, but any nearby level may be used with appropriate scaling of output level required.

4) Using an *accurate* DMM (preferably one having direct reading in dBv/dBu), measure the level on the Converted Analog Output phoenix connectors (**Item J**, page **14**). Be sure to make measurement of the FULL balanced output, NOT just between one of the outputs and ground!

5) Locate trim pots **P1**, **P2**, **P3**, and **P4** (see **Figure-3a** below). Adjust **P4** (channel **1**) through **P1** (channel **4**) for the desired analog level corresponding to the digital signal amplitude being supplied to the unit. For example, if your "house" Analog/Digital correspondence is for a -18 dBfs digital level to correspond to an Analog level of +0dBu, it would be easiest to set the digital source to -18 dBfs, set the gain calibration DIP switch for -18dBFS = 0dBu and then set **P1** through **P4** for 0dBu outputs on the phoenix Analog Output connectors. But, if a digital source of -20dBfs is applied, even though the facility references are for -18dBfs, then the analog output levels should be adjusted for a -2.0 dBu analog output level on the phoenix connectors.

Note: If the meter being used to measure the analog outputs is not so accurate at those relatively low signal levels, you may wish to increase the digital signal amplitude by some convenient factor like 10 or even 20 dB. (However, you should not increase above digital full scale.)

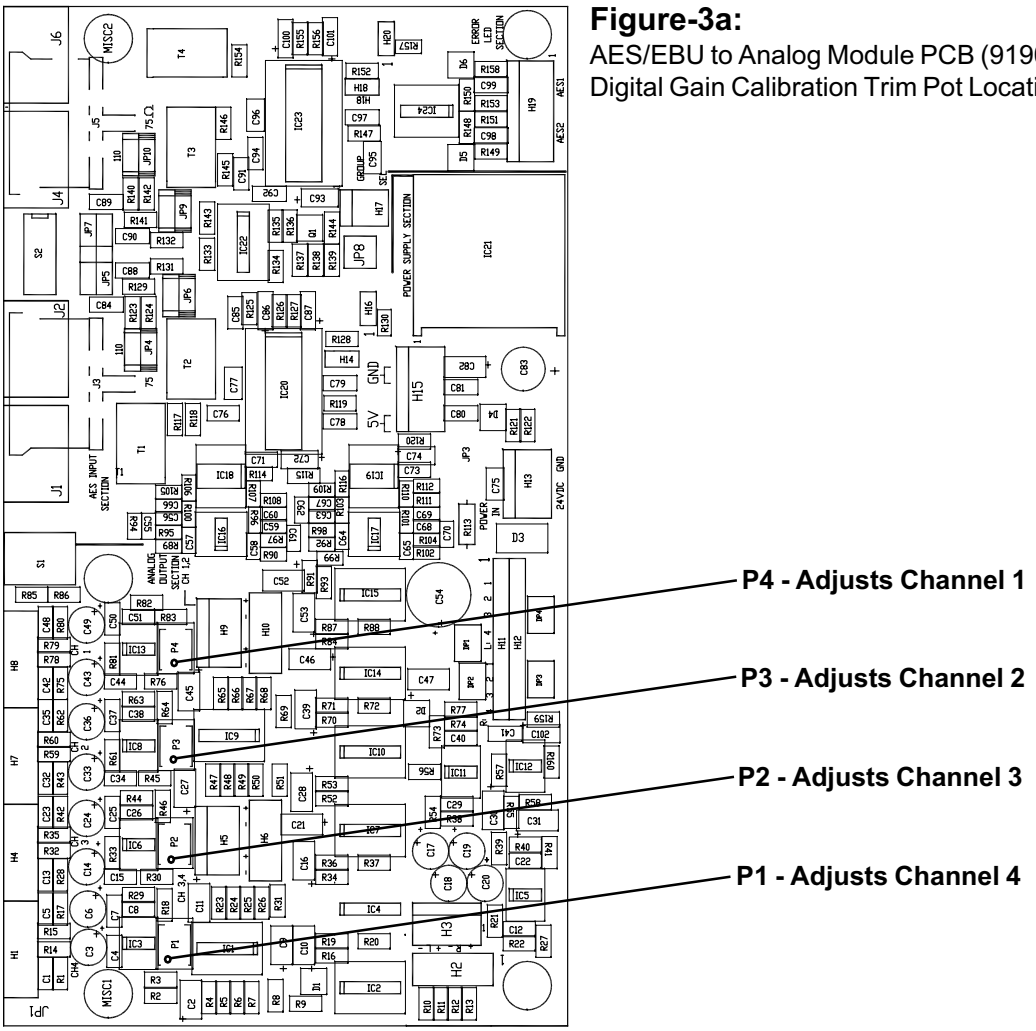

Figure-3a:
AES/EBU to Analog Module PCB (919050)
Digital Gain Calibration Trim Pot Locations

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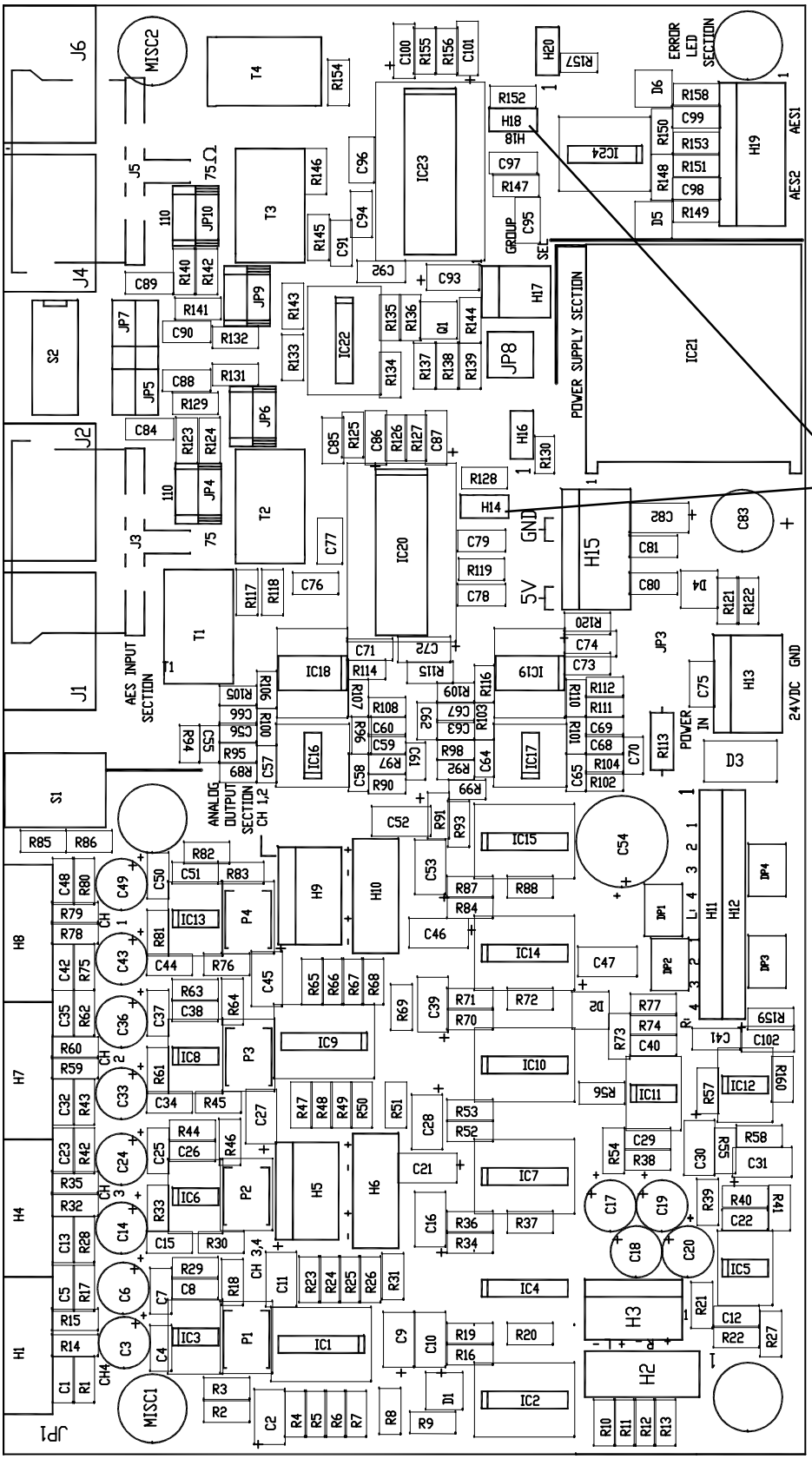
AES Error Jumper Locations (919050)



To disable indication of faulty AES data (and leave only indication of faulty reception), place jumpers on both **H14** and **H18**. See **Item 11**, page **10** for more information.

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Level Meter Rear Panel 6-Position DIP Switch Settings

Line Level (Auto) Calibration, Reference Level, and Display Mode

This DIP switch sets the **Line Level Calibration**, **Reference Level**, and **PPM/VU Display Mode**. See the descriptions and diagram below for setting information.

Line Level (Auto) Calibration:

The unit is calibrated at the factory. To recalibrate:

1) Turn on the power.

2) Apply the desired reference level (nominal 0) signal to all channels.

3) Make sure the **Reference Level** DIP sections (**2** and **3**) are set to the nearest level of the input signal being applied for calibration (i.e., 0, +4, +6 or +8). The user should make sure that the signal applied to all four channels is within +/- 4 dB of the reference level selected by DIP switch sections **2** and **3**.

4) Place DIP section **1** in the **DOWN** position.

5) Wait 10 seconds. The unit will remove the previous calibration and the *new* calibration will be applied.

6) Place DIP section **1** in the **UP** position and return unit to service.

7) Only ONE auto-calibration attempt may be made for each cycling of AC power to the unit. Once the **Line Level Calibration** DIP switch has been placed in the **CAL** position, it is necessary to cycle the power before that DIP switch will be functional again, EVEN if a calibration attempt was unsuccessful.

If one wishes to calibrate again, turn off the power to the unit and repeat steps 1 through 6.

Reference Level:

DIP switch sections **2** and **3** determine the **Reference Level**, which adjusts the level of the input signal and the resultant level displayed on the LED bargraphs. Factory setting is **+4 dB**. See DIP switch diagram below for settings.

Bargraph Display Mode:

DIP switch sections **4** and **5** determine how peak levels are displayed for the associated meters on the front panel. There are four possible settings; **VU Only**, **VU-PPM Floating Segment**, **PPM Only**, and **PPM-PPM Floating Segment**.

The **VU Only** selection has a **VU** floating segment when a **Peak Hold** value is selected using the **Internal 10-Position DIP Switch Module** (see page **24**). The factory default setting is **VU-PPM Floating Segment**. See diagam below for settings.

AMP Series Level Meter Rear Panel DIP Switch Settings

Meter Calibration	Reference Level	Display Mode
1 x Calibrate Operate 1 2 3 4 5 6	2 3 x **+8** dB **+6** dB **+4** dB **0** dB 1 2 3 4 5 6	4 5 x **VU** Only **VU-PPM** Floating Segment **PPM** Only **PPM-PPM** Floating Segment 1 2 3 4 5 6

Note: Position-6 of DIP switch is NOT used.

See **AMP Series Level Meter Internal 10-Position DIP Switch Settings** on page **24** for setting the **Peak Hold** and **PPM Ballistics** characteristics.

Meter Calibration NOTE:

For more accurate indication of signal levels, meters are tuned to effect a "rounding" function, which occurs BETWEEN the thresholds of any two bargraph segments. This means the level meter zero LED segment will turn on at one-half the smallest spacing between LED segments (mid-scale resolution) *before* that segment's scale indication. Below are the offset amounts.

53-Segment Meters: The "rounding offset" is **0.5 dB** for the **Analog (extended VU)**, **Digital**, **Nordic**, and **DIN** scales. It is **0.25 dB** for the **BBC** scale and **0.125 dB** for the **VU** scale.

Example: Using the **Analog (extended VU)** scale, a meter calibrated for a **+4 dBu** nominal level will actually turn the zero LED segment of the level meter on at **+3.5 dBu** (and so *all* segments will turn on at **0.5 dBu** *before* each ones associated silk-screened scale indication).

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Level Meter Internal 10-Position DIP Switch Settings

This 10-position DIP switch is accessed by removing the top cover of the **AMP** unit and is located on the **919174 PCB** (the same PCB on which the 6-position *rear panel* DIP switch is located). See page **25** for a diagram of the **919174** PCB and the DIP switch location.

AMP Series 26- and 53-Segment Level Meter Internal 10-Position DIP Switch Settings

Scale Selection		Peak Hold (Bargraph Display)	PPM Ballistics (Bargraph Display)
Do Not Use	**NORDIC** Scale	Peak Hold - **Manual** (**See Note 2**)	IEC268-10, Type 1
Extended VU Scale (Standard **Analog**)	**DIN** Scale	Peak Hold - **3 Second**	IEC268-10, Type 2
VU Scale	**Do Not Use**	Peak Hold - **10 Second**	DIN 45406
BBC Scale	**Custom** Scale (**See Note 3**)	Peak Hold - **Off**	Single Sample Rise Time (SSRT)

Phase Correlation Display (53-Segment Meters Only)

PC **Off** PC **On**

NOTES:

1) Switch positions **1** and **10** are NOT used and should be left at the factory set position.

2) The **Peak Hold - Manual** setting allows the bargraph display meters to indefinitely maintain the peak hold value until it is reset by the operator, either by pressing a reset button (a special option specified at time of order) or by removing power and then reapplying power to the unit (unplug/replug power cord). Contact Wohler Technologies for more information about this feature.

3) Contact Wohler Technologies for information about custom scales.

PPPM Characteristics (Ballistics):

The **PPM** characteristics determine the **Integration Time** (rise time) and **Return Time** (fall time) of the level meter. The **Integration Time** is the time it takes for the lighted segments of the level meter, after application of a 5 Khz tone at a certain reference level, to *rise* within a specified number of dB of that level. **Return Time** is the time it takes for the lighted segments of the level meter to *fall* a certain number of dB after removal of a 5 Khz tone of a certain reference level. The **PPM** characteristics available for selection using DIP switch sections **7** and **8** of the 10-position **Internal DIP Switch** (as shown in the above diagram) are as follows:

IEC268-10, Type 1:	Integration (Rise) Time is **5 ms** (-2 dB), Return (Fall) Time is **1.7 seconds** (20 dB)
IEC268-10, Type 2:	Integration (Rise) Time is **10 ms** (-2 dB), Return (Fall) Time is **2.8 seconds** (24 dB)
DIN 4506:	Integration (Rise) Time is **5 ms** (-2 dB), Return (Fall) Time is **1.5 seconds** (20 dB)
Single Sample:	Integration (Rise) Time is a single sample, Return (Fall) Time is **1.5 seconds** (20 dB)

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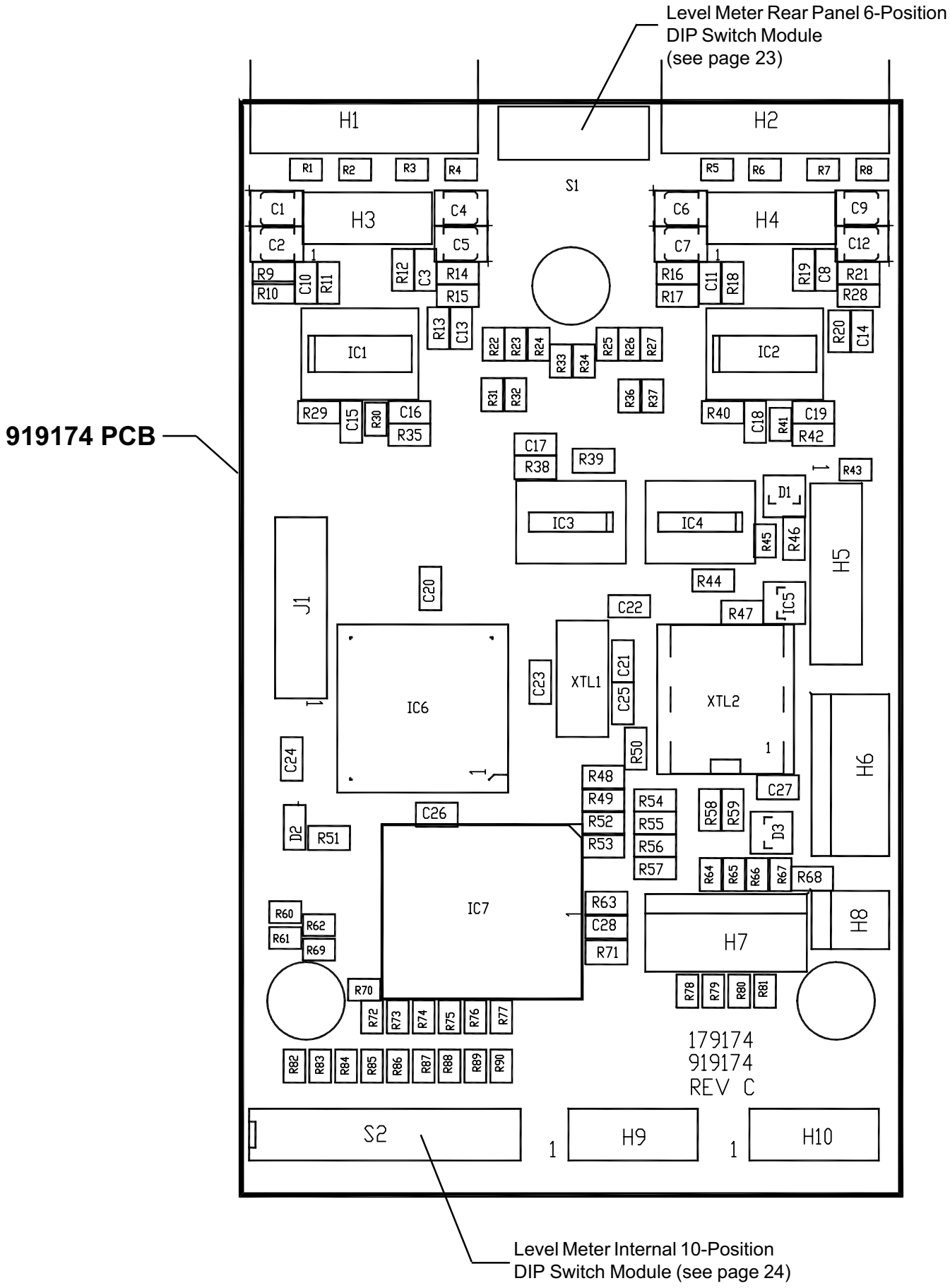
Level Meter DIP Switch Locations



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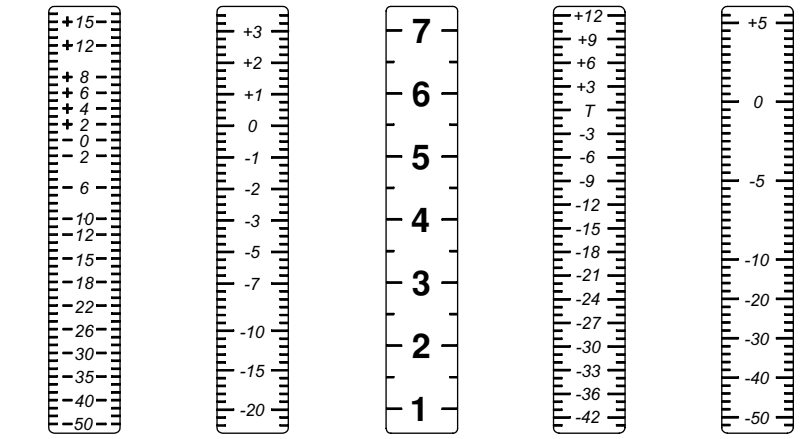
Level Meter Alternative Scales

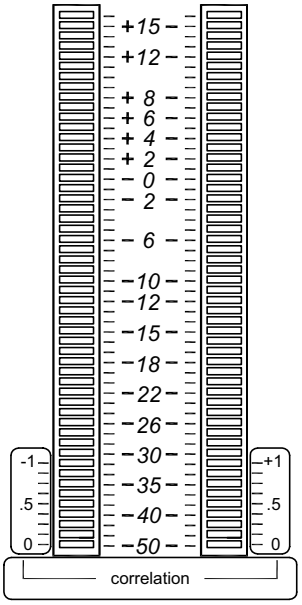
The standard scale used on the **AMP2A-VSD/-VSDA** level meters (53-segment) is the **Extended VU** scale (see diagram below). However, if alternative scale characteristics are selected for the level meters using the **Level Meter Internal 10-Position DIP Switch** (page **24**), it is recommended that a label with the appropriate scale be applied to the front panel LED bargraph level meters. See the diagram below for scale comparison. Scale selection includes the **Extended VU** (standard Analog), **VU**, **BBC**, **NORDIC**, **DIN**, and **Custom** (not shown) scales. Contact **Wohler Technologies** for information about alternative scale labels.



Extended VU (**Analog**) Scale (standard) | **VU** Scale | **BBC** Scale | **NORDIC** Scale | **DIN** Scale

Level Meter Phase Correlation Feature

Since it is sometimes helpful to observe phase relationships between two signals being monitored, a **Phase Correlation** feature can be implemented within the lower section of an existing bargraph pair in the 53-segment LED bargraph level meters used in the **AMP2** units. This feature may be turned ON and OFF by setting the **Level Meter Internal 10-Position DIP Swich** module (page **24**). Below is an illustration of the level meter bargraphs with the **Phase Correlation** label applied.



When the audio level in BOTH channels is high enough, the **Phase Correlation** display occupies the lower few segments of both bargraphs of a stereo pair. Behavior of the **Phase Correlation** indication is as follows:

Positive correlation = ascending **AMBER** bar in the ***right*** bargraph
Negative correlation = ascending **RED** bar in the ***left*** bargraph

The bottom nine (9) segments are used by the 53-segment LED bargraph display for **Phase Correlation** indication. One additional segment above the active correlation region is always OFF, to serve as a marker. The **Phase Correlation** display is visible ONLY so long as the VU audio level is above this blank segment (*tenth* from the bottom).

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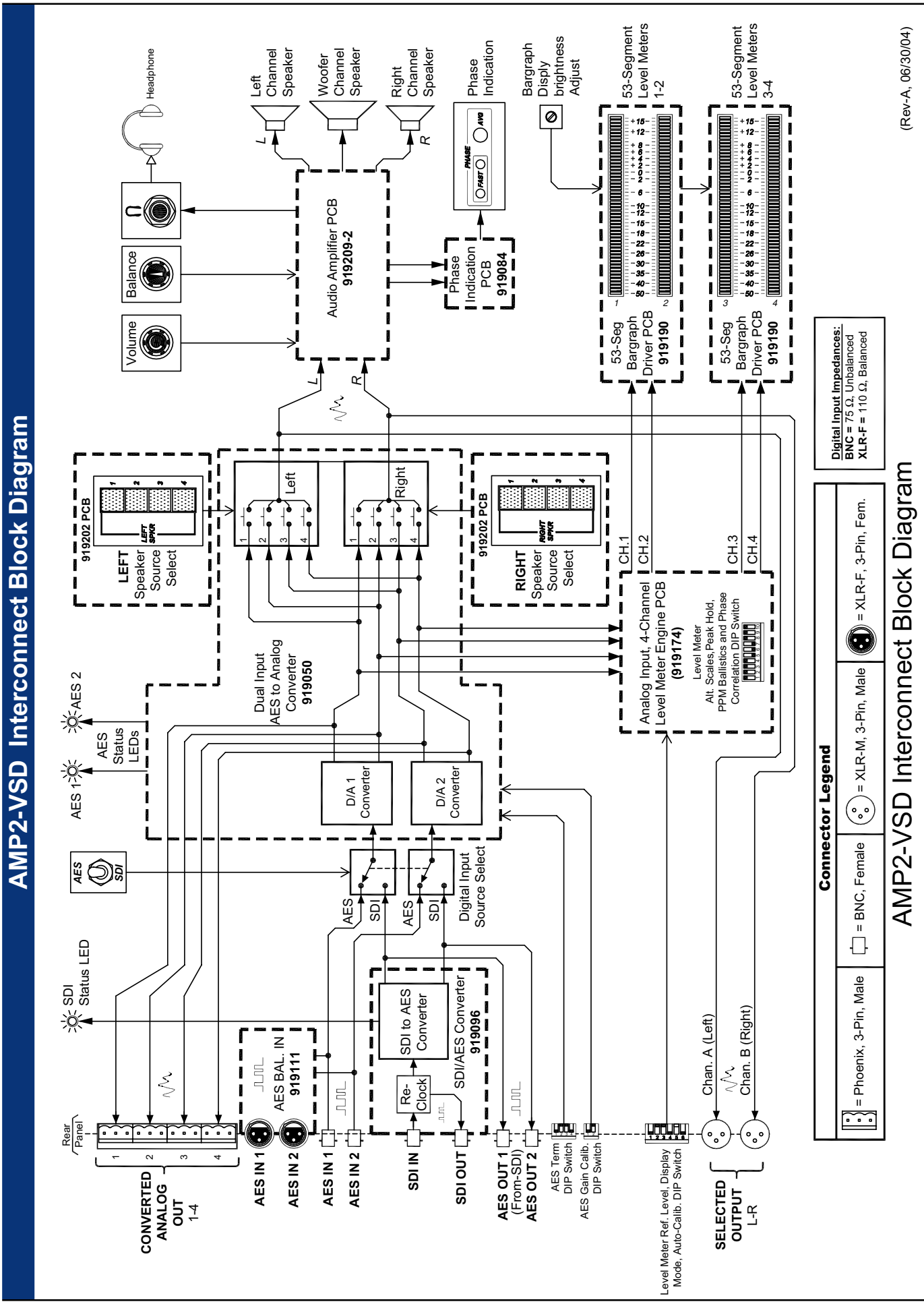

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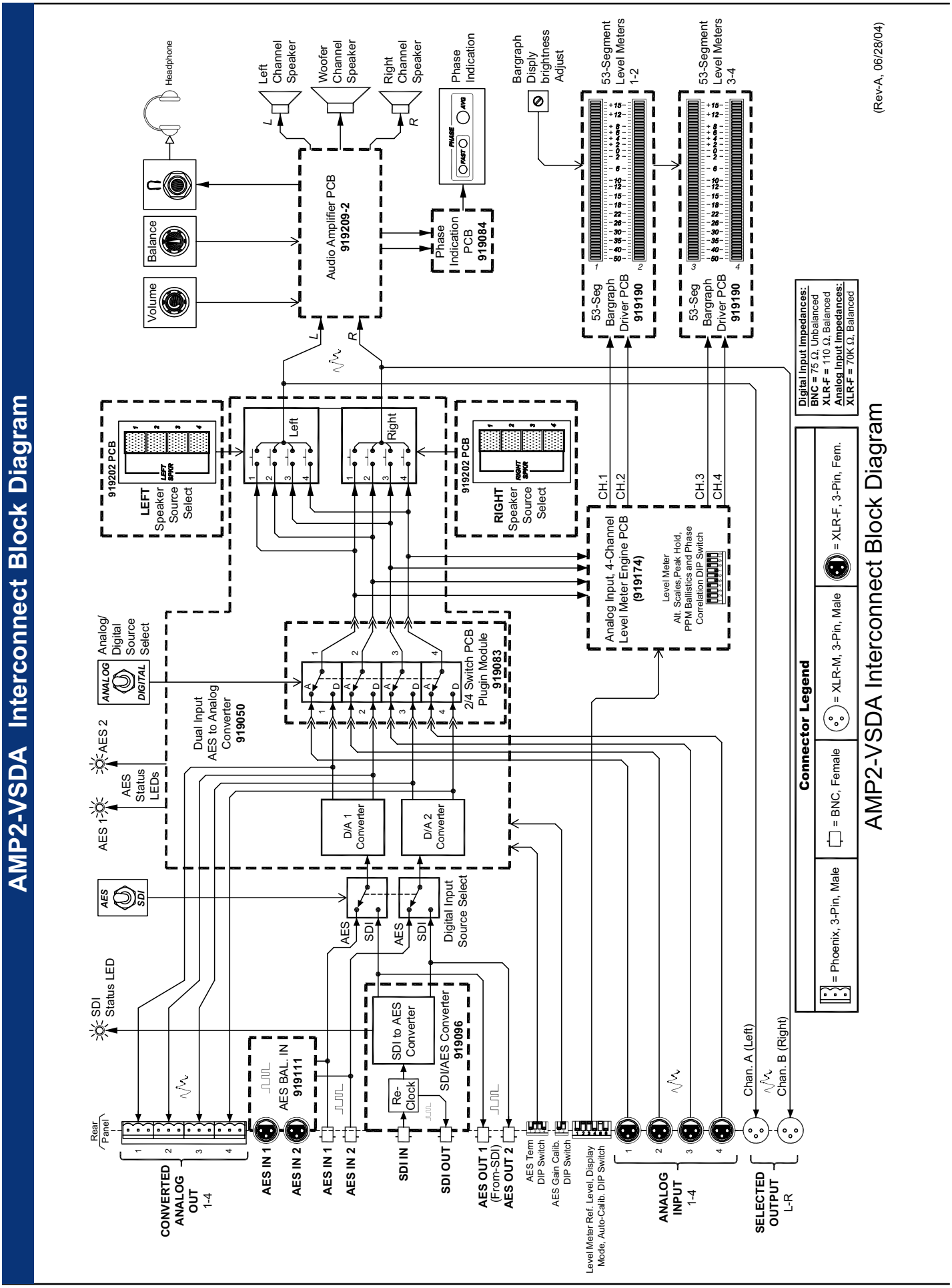

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NOTE:

PCB layout and schematic support documentation is available upon request.

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